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14

15   **UNITED STATES DISTRICT COURT**
16   **NORTHERN DISTRICT OF CALIFORNIA**
                        SAN FRANCISCO DIVISION
17

18   UNITED STATES OF AMERICA,   Case No. 3:2-cr-00249-RS

19   Plaintiff,   **DEFENDANT'S RULE 16(b)(1)(C)(iii)**
                                             DISCLOSURES REGARDING EXPERT
20   v.   **ERIK MIN**

21   ROWLAND MARCUS ANDRADE,   Judge: Hon. Richard Seeborg, Chief Judge

22   Defendant.

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24   Mr. Andrade hereby discloses, pursuant to Federal Rule of Criminal Procedure 16(b)(1)(C)(iii)

25   and Federal Rule of Evidence 702, that it may proffer Mr. Erik Min as an expert witness at trial.[1]

26   _____
     [1] Mr. Andrade advises that defense counsel's work with this expert is ongoing. Mr. Andrade
27   reserves the right to supplement the disclosures herein if additional opinion evidence is
     developed before the expert may be called as a witness.
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I.   Qualifications & Prior Testimony

Mr. Min's testimony will be based on his experience, education, and training, which render him an expert in cryptocurrency, blockchain technology, and digital forensics. Mr. Min has over 20 years of investigative and advisory experience across cryptocurrency, blockchain technologies, intellectual property theft, fraud, and other digital forensic-based work. Since 2019, Mr. Min has served as the Senior Director of the Blockchain & Digital Assets Practice at FTI Consulting, Inc. Mr. Min holds numerous blockchain and cryptocurrency certifications through the Blockchain Council, including as a Certified Bitcoin Expert, Certified Blockchain Expert, and Certified Blockchain Developer. Mr. Min is also certified as a Crypto Research and Investigations Specialist by Crystal Intelligence, a Certified Investigator by TRM Labs, and an EnCase Certified Examiner. A copy of Mr. Min's *curriculum vitae* will be provided to the government.

Within the last four years, Mr. Min has previously submitted a report and testified at trial as an expert on cryptocurrency matters in *Christi Wohlt v. August Wohlt*, Case No. 18C01-1507-DR-0078, State of Indiana, Delaware County Circuit Court (2022).

II.   Anticipated Testimony

In connection with Mr. Andrade's Indictment for wire fraud under 18 U.S.C. § 1343, the government has alleged that Mr. Andrade and others "misrepresented the state of development of the [AML Bitcoin] technology and the viability and timeline for the final release of the functional AML Bitcoin cryptocurrency." Indictment, ECF No. 1, at 4. At trial, Mr. Min will educate the jury about blockchain technology generally, in addition to the specific blockchain technology and other applications developed in connection with the AML Bitcoin cryptocurrency, including the scope and quality of development work and overall architecture of the AML Bitcoin project based on FTI's analysis of source code and databases associated with AML Bitcoin that are still available from the project.

Mr. Min will explain how AML Bitcoin, like other cryptocurrencies, consisted of a network of various software applications tied to blockchain technology. Mr. Min will describe to the jury how blockchain technology works generally, and how cryptocurrency is a digital asset transmitted

1 using blockchain technology by users who send and receive cryptocurrency using "wallet"

2 applications linked to an "address" on the blockchain where cryptocurrencies can be sent. Mr. Min

3 will explain that "wallet" applications store the "public keys" and "private keys" specific to each

4 cryptocurrency token that are required in order to transact with those tokens on the blockchain.

5   Mr. Min will describe how conducting transactions on the blockchain is a multi-step

6 process: users will request transactions (such as sending cryptocurrencies to other users), and once

7 transactions are verified or approved under certain criteria, they are compiled into transaction

8 "blocks" that are posted to the blockchain, thereby effectuating the requested transactions.

9   At trial, Mr. Min will testify that AML Bitcoin was a cryptocurrency that used a private,

10 "Hyperledger Fabric" blockchain to record the sending and receiving of AML Bitcoin tokens using

11 proprietary AML Bitcoin wallet applications. Mr. Min will further testify that the distinguishing

12 feature of the AML Bitcoin source code is that the criteria for verifying transactions required a

13 user to confirm their identity using biometric data before the transaction was approved. Within the

14 source code reviewed by FTI, Mr. Min will explain the AML Bitcoin source code referenced

15 biometric identity verification software stored within repositories labeled "CrossVerify," which

16 evaluated a user's biometric data and "know-your-customer" ("KYC") data such as driver's

17 license and passport information for processing transactions.

18   Mr. Min will explain how FTI reviewed the AML Bitcoin project's Amazon Web Services

19 account, and numerous source code repositories associated with the AML Bitcoin project stored

20 on "BitBucket," a cloud-based platform that enables teams of developers to write and store source

21 code for software applications by hosting text-based source code files, configuration files, project

22 documentation, software architecture, associated databases, and software scripts. Mr. Min will

23 describe how FTI searched across millions and reviewed thousands of lines of source code from

24 over seventy BitBucket repositories and databases associated with the various pieces of software

25 that comprised AML Bitcoin cryptocurrency, including: (1) the servers used to host data and the

26 code to approve transactions with AML Bitcoin cryptocurrency, (2) the underlying Hyperledger

27 Fabric blockchain that recorded AML Bitcoin transactions, (3) the repositories containing software

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1 programs that comprised the biometric identity verification and "know-your-customer" ("KYC")

2 data collection functions of AML Bitcoin that were labeled "CrossVerify," and (4) the user

3 interface software for AML Bitcoin, such as mobile and desktop applications for the AML Bitcoin

4 wallet, mobile applications for identity verification, and the AML Bitcoin "explorer" application

5 used to view transactions on the blockchain.

6   Although FTI conducted an extensive review of the substantial amount of AML Bitcoin

7 source code available through these repositories, Mr. Min will explain there are several limitations

8 to the data currently available. Mr. Min will describe how in reaching his conclusions, he discussed

9 and reviewed the source code and databases related to AML Bitcoin with software developers who

10 worked on the project, in addition to reviewing statements and other materials from software

11 developers. Mr. Min will testify, however, that his analysis and conclusions are limited to FTI's

12 detailed review of the source code, log files, and databases themselves. Mr. Min will further

13 explain that the source code, log files, and databases reviewed have inherent limitations, because

14 the source code repositories that remain in existence were established in late 2018. Mr. Min will

15 explain that while there is evidence of consistent and substantial development work conducted

16 prior to late 2018, the records of that work appear to have been consolidated from other repositories

17 (that are unavailable) into an AML Bitcoin BitBucket created in November 2018 to enable

18 integration and development of the final AML Bitcoin cryptocurrency. Accordingly, Mr. Min will

19 explain, the development records prior to creation of the consolidated repository in November

20 2018 are necessarily incomplete.

21   Although the remaining development records of earlier work appear incomplete, Mr. Min

22 will describe how certain log files and databases within the remaining repositories include

23 timestamps and other records showing substantial and consistent development of the underlying

24 biometric verification software (and associated web and mobile applications) between March 2017

25 and November 2018. Moreover, Mr. Min will explain how the significant amount and quality of

26 source code uploaded to the consolidated AML Bitcoin repositories reflects the work of intelligent

27 and qualified developers over at least several months, if not a year or more, prior to establishing

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1   the consolidated AML Bitcoin repositories in late 2018.

2   Mr. Min will describe database records showing substantial and consistent development of

3   the "CrossVerify" biometric identification software between March 2017 and November 2018,

4   with nearly 44,000 date-stamped entries to the database during this timeframe.

5   Mr. Min will explain how source code timestamp data associated with an Android mobile

6   application for interfacing with the CrossVerify technology indicates development of a custom

7   software package to connect the CrossVerify technology with a mobile application interface began

8   as early as March 16, 2017, in addition to other records suggesting it was created (at least initially)

9   by a software development company called "NewGen." Mr. Min will further testify that

10   development timestamps show that CrossVerify demo software was uploaded to the database on

11   April 18, 2017, and subsequent testing of the CrossVerify technology continued from April 2017

12   through May 2018.

13   Mr. Min will also describe how over four thousand "invitations" for demo user accounts

14   were sent between April 2017 and May 2018 to a mixture of email addresses, including some that

15   appear to be associated with real companies and individuals involved in development of the

16   CrossVerify technology, and others sent to automated test email addresses. Mr. Min will describe

17   how over 6,600 "users" and associated "server keys" tied to verification addresses for testing

18   accounts were created between May 2017 and May 2018, representing a large amount of demo

19   user data testing for the CrossVerify application.

20   Mr. Min will further testify that database records indicate that CrossVerify's biometric data

21   collection and authentication features were evaluated during this time through "verification logs"

22   that assessed data such as (1) "user_ID," (2) "face_score," (3) "iris_score," and (4) "result," among

23   others. Mr. Min will explain how these "verification log" records include timestamps showing

24   testing of the biometric verification functionality as early as April 26, 2017.

25   Mr. Min will also explain that database records indicate development began on integrating

26   CrossVerify's biometric identification technology with blockchain technology by at least March

27   23, 2018. Mr. Min will explain that the CrossVerify database includes a "Test_blockchain"

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configuration file that would deploy the biometric identification data to a "smart contract," which appears to be a blockchain-based software program that was used to evaluate the biometric data. Mr. Min will testify how the "Test_blockchain" configuration file includes comments in the source code dated as early as March 23, 2018 and April 4, 2018.

Mr. Min will further testify that development of CrossVerify's web-based application began as early as March 21, 2018. Mr. Min will explain that the configuration and user account creation files for the CrossVerify web application include comments dated March 21, 2018, describing calls between developers and modifications to the source code. Additionally, Mr. Min will testify that testing of CrossVerify's ability to collect and store "know-your-customer" ("KYC") data began as early as April 2018, as server files dated April 11, 2018 indicate the ingestion of a demo user's driver's license and passport data. Mr. Min will further explain that an automated "last modified" timestamp from a "Gradle" software development tool shows subsequent development work on CrossVerify's mobile Android application to connect with the servers hosting the CrossVerify technology continued through November 15, 2018.

Mr. Min will testify that in November 2018, the AML Bitcoin BitBucket was created in what appears to be an effort to integrate and consolidate the CrossVerify technology described above with preexisting cryptocurrency software[2] to create AML Bitcoin. Mr. Min will further testify that the consolidated AML Bitcoin BitBucket repositories contain additional development data, including "commit" records (*i.e.*, records identifying when changes were "committed" to the source code in the repository itself). Mr. Min will explain that in December 2018, nearly 1 million lines of source code were committed to the BitBucket repositories associated with AML Bitcoin through just 9 "commit" records, followed by several million lines of additional code and data with relatively few "commit" records in the following months. Mr. Min will testify that the

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[2] Subject to this Court's ruling on Defendant's motion to exclude evidence relating to Atencoin as impermissible 404(b) evidence, Mr. Min may be called upon to testify how the preexisting cryptocurrency source code for AML Bitcoin was derived from Atencoin, based on his review of Atencoin source code from 2015 obtained from its developers. In the event this Court denies Defendant's 404(b) motion, the Defendant will make the appropriate supplemental disclosures to the government regarding Mr. Min's anticipated testimony relating to Atencoin consistent with Rule 16(b)(1)(C)(iii).

significant amount of code committed to the consolidated AML Bitcoin BitBucket repositories shortly after they were established is additional evidence reflecting consistent and substantial development work that occurred prior to December 2018 on the various component applications for AML Bitcoin (including CrossVerify, the blockchain software for the cryptocurrency itself, and related applications). Based on the evidence showing that a substantial amount of development work for the CrossVerify project had been completed between March 2017 and November 2018, Mr. Min will testify that it would have been possible to integrate the CrossVerify technology and a preexisting cryptocurrency source code within a minimum of several months, assuming adequate resources.

Mr. Min will also testify that nearly 16.5 million lines of code were committed and used for development in the remaining AML Bitcoin repositories reviewed by FTI. Based on his experience with complex cryptocurrency projects, Mr. Min will testify that the substantial amount of source code reflected in the AML Bitcoin repositories is consistent with similar projects comparable in size and complexity to AML Bitcoin, reflecting the dedication of substantial resources and reasonable efforts to develop AML Bitcoin. Mr. Min will also testify that the quality and sophisticated nature of the source code reviewed by FTI is reflective of at least 18–24 months' worth of concentrated work performed by qualified and intelligent developers.

Mr. Min will also testify that despite the sophisticated and substantial nature of the source code itself, based on the currently available data, there are several document related aspects of the project that indicate it was poorly managed. For example, Mr. Min will explain that the different number of development teams in the AML Bitcoin project is atypical, which appears to have complicated development efforts. Mr. Min will also explain how the currently available AML Bitcoin repositories lack documentation of key management functions to be expected of a comparable project, including development protocols to ensure changes to the source code are approved, documented, and logged in the correct repositories. Additionally, Mr. Min will explain, the currently available repositories lack clear documentation on the architecture of the AML Bitcoin platform itself, or the management of the various servers involved. Mr. Min will also

1 explain that the repositories still available lack documentation of protocols for ongoing

2 development and testing for quality assurance and security reviews, nor is there a clear disaster

3 recovery protocol.

4   Mr. Min will further testify that despite the indicia that the AML Bitcoin project was poorly

5 managed, the underlying AML Bitcoin technology was either substantially close or fully functional

6 by the end of the project. Mr. Min will explain that based on the currently available data in the

7 remaining source code repositories and databases, it is difficult to pinpoint when the software for

8 the cryptocurrency itself was integrated with the CrossVerify biometric identify verification and

9 KYC data collection software. Mr. Min will explain that while the AML Bitcoin source code

10 includes cross-references to CrossVerify databases for performing biometric identify verification,

11 the existing development records are unclear as to when this integration occurred and whether it

12 was fully functional at the time, based on the limitations of FTI's review. That is because, Mr. Min

13 will explain, the AML Bitcoin source code incorporated and relied upon certain third-party

14 software (including certain libraries and "APIs") that existed outside the AML Bitcoin source code

15 itself. Despite lacking this third-party data, Mr. Min will testify, FTI has been able to successfully

16 run certain aspects of the AML Bitcoin technology and associated applications (such as the web-

17 based and Android-based mobile applications) using the limited source code and data available.

18 Additionally, Mr. Min will also testify that FTI observed transaction data on AML Bitcoin's

19 Hyperledger Fabric blockchain in April 2020, suggesting the project was completed around that

20 time. Taken together, Mr. Min will testify that AML Bitcoin was substantially close or fully

21 developed before the project was ended.

22   To assist his testimony, Mr. Min may use demonstratives based on the AML Bitcoin

23 source code and repositories reviewed by FTI. The defense will provide a copy of the

24 demonstratives to the government prior to trial.

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/s/ Erik Min
Digitally signed by Erik Min
Date: 2025.01.10
18:55:09 -08'00'

Erik Min
3   Senior Director, Blockchain & Digital
Assets Practice
4   FTI Consulting

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6   Respectfully submitted,

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DATED: January 10, 2024   KING & SPALDING LLP
8

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